4/16/2010 MTG. HANDOUT #1

CDM

Memorandum

To: *Paul Kennedy, Attleboro*

From: *James W. Small*

Date: *April 15, 2010*

Subject: *Attleboro Wastewater Treatment Facility*
Nitrogen Removal
Full-Scale Pilot Plant

Below is a brief description of a full-scale pilot plant operation for the Attleboro Wastewater Treatment Plant. The purpose of the pilot plant is to demonstrate if proposed modifications to the existing aeration basins will reduce nitrogen in the plant effluent to the permit limits.

Background

The existing wastewater treatment facility was designed to convert nitrogen from ammonia-N to nitrite-N and nitrate-N. It was not designed to remove total N.

One way to remove nitrogen is to add anoxic zones to the existing aeration basins. This appears feasible because the plant currently uses only 7 out of 10 aeration compartments.

In order to create these anoxic zones, the aerators in selected compartments would be turned off. In order to keep the Mixed Liquor Suspended Solids (MLSS) in suspension while the aerators are not operating, it will be necessary to provide mixing within the anoxic zones.

This solution is not recommended as a long term solution at the present time, due to uncertainty about future flows and loads, future effluent requirements that may change in a relatively short time frame, changes to the sewer service area, and advances in nitrogen removal technologies. It is believed that this approach will likely meet the current total nitrogen limit under current flows and loads, and will provide valuable process information for future plant designs. For this reason, it is characterized as a "pilot" phase, although it is expected that compliance with the nitrogen limits will be achieved within about 16 months.

Proposed Program

The proposed pilot program will consist of the following:

- Technical memorandum on proposed modifications to the aeration basins;
- Design of proposed improvements;

- Construction of improvements;
- Pilot operation for a period of 2 years (through all seasons); and
- Pilot status reports.

Technical Memorandum

The City of Attleboro (City) has developed a calibrated BioWin model of the existing facility. The City proposes to use the model to evaluate the nitrogen removal capability of the existing aeration basins for the following modifications, based on current flows and loads:

- Converting 2 to 4 of the existing aeration compartments to anoxic zones by adding submersible mixers;

The model will be used to evaluate the impact of the following variables on nitrogen removal capability:

- Temperature of wastewater;
- RAS (Return Activated Sludge) rate;
- MLSS concentration; and
- Aerobic SRT.

A technical memorandum that discusses results of the various model simulations as well as a recommendation for implementation will be prepared. The recommendations for implementation will include a complete description of the proposed improvements including number, type, and size of submersible mixers recommended plus associated electrical, instrumentation, and control improvements.

Design Documents

Based on the recommendations of the technical memorandum, construction documents will be prepared. It is likely that these proposed improvements will consist of at least the following:

- 2 to 4 submersible mixers located in selected compartments of the existing aeration basins;
- Associated electrical improvements required to accommodate the mixers; and
- Associated instrumentation and controls required for proper operation of the modified system.

Construction Phase

The project would be bid and awarded to the lowest eligible and responsible bidder. Construction would include shop drawing submittals, procurement of equipment, installation and performance testing of equipment. The contractor will be required to maintain the operation of the existing facilities during construction.

Pilot Operation

The modified aeration basins would be placed in operation. Nitrogen removal would be monitored and the performance of the facility would be used to verify the accuracy of the model during different seasons. The City will attempt to nitrify and denitrify during the winter months. During the monitoring period, the system would be optimized with respect to

- Anoxic volume;
- RAS rate; and
- Aerobic SRT (MLSS concentration).

  Note: The SRT of the pilot operation will be much lower than the SRT for the current operation. The ability to operate at lower SRTs will be evaluated during the pilot operation.

The temperature of the wastewater will be recorded so that the impact of the temperature on plant performance can be evaluated. Status reports highlighting plant performance will be produced in November of 2012 and 2013. It is expected that the plant will likely come into compliance with the nitrogen limits in the current permit upon completion of the construction of the pilot facilities.

A final pilot status report would be submitted by February 28, 2013, four months after the end of the 2012 nitrogen removal pilot period. To the extent needed, that report would also contain a schedule for construction of the next phases of the work. The need for further work would depend on the reliability of the pilot facilities as long term solutions, the potential for lower nitrogen levels, the possible need for aluminum control and the potential for expansion of the sewer service area.

Proposed Schedule

Task	Date
Technical Memorandum	May 2010 through July 2010
Design	August 2010 through December 2010
Bidding/Construction	January 2011 through October 2011
Pilot Operation	November 2011 through October 2013
Status Reports on Plant Performance	November 2012, November 2013
Final Report	February 28, 2014

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